

CLAIMS

1. An evaporator comprising a heat exchange core comprising a plurality of tube groups arranged in rows as spaced forwardly or rearwardly of the evaporator and each comprising
5 a plurality of heat exchange tubes arranged in parallel at a spacing laterally of the evaporator, and a lower tank disposed at a lower end of the core and having connected thereto lower ends of the heat exchange tubes providing the tube groups,

the lower tank having a top surface, front and rear opposite
10 side surfaces and a bottom surface and being provided in each of front and rear opposite side portions thereof with grooves formed between respective laterally adjacent pairs of heat exchange tubes and extending from an intermediate portion of the top surface with respect to the forward or rearward direction
15 to the side surface for causing water condensate to flow therethrough.

2. An evaporator according to claim 1 wherein the grooves have a capillary effect to draw the condensate on the surface of the lower tank into the groove.

20 3. An evaporator according to claim 1 wherein each of the grooves includes a first portion existing on the top surface of the lower tank, and the first portion has a bottom face gradually lowered from the intermediate portion of the top surface toward a front or rear side edge thereof.

25 4. An evaporator according to claim 1 wherein the top surface of the lower tank is highest at the intermediate portion and is so shaped as to lower gradually from the highest portion toward the side surface, and each of the grooves extends from

the front or rear side of the highest portion of the lower tank top surface to the side surface of the lower tank.

5 5. An evaporator according to claim 4 wherein each of the grooves includes a first portion existing on the lower tank top surface, and the first portion has the same depth over the entire length of the first portion.

10 6. An evaporator according to claim 4 wherein each of the grooves includes a first portion existing on the lower tank top surface, and the first portion has a depth gradually increasing from the highest portion side of the top surface toward the side surface.

15 7. An evaporator according to claim 4 wherein each of the grooves includes a first portion existing on the lower tank top surface, and the first portion has a depth of 0.5 to 2.0 mm.

20 8. An evaporator according to claim 4 wherein each of the grooves includes a first portion existing on the lower tank top surface, and the first portion has a groove width gradually increasing from a bottom of the groove toward an opening thereof.

25 9. An evaporator according to claim 8 wherein the first portion of each groove is 0.067 to 0.33 in the ratio $L1/L2$ of the width $L1$ of the groove bottom to the width $L2$ of the opening.

25 10. An evaporator according to claim 1 wherein the top surface of the lower tank is in the form of a horizontal flat surface.

11. An evaporator according to claim 10 wherein each of

the grooves includes a first portion existing on the lower tank top surface, and the first portion has a groove width gradually increasing from a bottom of the groove toward an opening thereof.

5 12. An evaporator according to claim 1 wherein each of the grooves has a flat bottom face.

13. An evaporator according to claim 1 wherein each of the grooves has a bottom face shaped to a circular-arc cross section which is recessed toward a widthwise midportion of
10 a bottom of the groove.

14. An evaporator according to claim 13 wherein the bottom face of each groove has a radius of curvature which is $1/2$ of the width of the groove bottom.

15. An evaporator according to claim 1 wherein each of
15 the grooves has a first portion existing on the lower tank top surface, and the ratio $W2/W1$ of the straight distance $W2$ between front and rear ends of the first portion to the entire width $W1$ of the lower tank in the forward or rearward direction is 0.16 to 0.47.

20 16. An evaporator according to claim 1 wherein each of the grooves includes a second portion existing at a junction of the top surface of the lower tank and the side surface thereof, and the second portion has a bottom face inclined downward forwardly or rearwardly outward.

25 17. An evaporator according to claim 16 wherein the bottom face of the second portion of each groove has an angle of inclination of 20 to 50 deg with a vertical plane.

18. An evaporator according to claim 16 wherein each of

the grooves includes a first portion existing on the top surface of the lower tank and having a bottom face, and in a longitudinal section of the groove, the bottom face of the first portion is shaped in the form of a circular arc extending from the
5 highest portion side of the top surface of the lower tank forwardly or rearwardly outward as curved downward, the angle of inclination of a straight line through front and rear ends of the first portion bottom face with a vertical plane being smaller than the angle of inclination of the second portion
10 bottom face with a vertical plane.

19. An evaporator according to claim 1 wherein each of the grooves includes a third portion existing on the side surface of the lower tank, and the third portion has a vertical bottom face.

15 20. An evaporator according to claim 1 wherein each of the grooves includes a third portion existing on the side surface of the lower tank, and the third portion has a depth of 0.3 to 0.8 mm.

21. An evaporator according to claim 1 wherein each of
20 the grooves has a third portion having the same width from a bottom of the groove to an opening thereof.

22. An evaporator according to claim 21 wherein the third portion of each groove has a width of 0.5 to 1.5 mm.

23. An evaporator comprising a heat exchange core having
25 a plurality of heat exchange tubes arranged laterally of the evaporator at a spacing, and a lower tank disposed at a lower end of the core and having connected thereto lower ends of the heat exchange tubes,

the lower tank having a top surface, front and rear opposite side surfaces and a bottom surface and being provided on at least one of the front and rear side surfaces thereof with a plurality of grooves extending vertically and arranged
5 laterally of the evaporator at a spacing for causing water condensate to flow therethrough.

24. An evaporator according to claim 23 wherein the grooves are formed in each of the front and rear side surfaces of the lower tank.

10 25. An evaporator according to claim 23 wherein the entire top surface of the lower tank has a portion at least closer to each of front and rear opposite side edges thereof and lowered forwardly or rearwardly outward.

26. An evaporator according to claim 23 wherein the top
15 surface of the lower tank is highest at an intermediate portion with respect to the forward or rearward direction and is so shaped as to lower gradually from the highest portion toward a front or rear side.

27. An evaporator according to claim 23 wherein the grooves
20 have a capillary effect to draw the condensate on the surface of the lower tank into the groove.

28. An evaporator according to claim 23 wherein each of the grooves has a vertical bottom face.

29. An evaporator according to claim 23 wherein each of
25 the grooves has a depth of 0.3 to 0.8 mm.

30. An evaporator according to claim 23 wherein each of the grooves has the same width from a bottom of the groove to an opening thereof.

31. An evaporator according to claim 30 wherein each of the grooves has a width of 0.5 to 1.5 mm.

32. An evaporator according to claim 23 wherein each of the grooves has a flat bottom face.

5 33. An evaporator according to claim 23 wherein each of the grooves has a bottom face shaped to a circular-arc cross section which is recessed toward a widthwise midportion of a bottom of the groove.

10 34. An evaporator according to claim 33 wherein the bottom face of each groove has a radius of curvature which is $1/2$ of the width of the groove bottom.

35. A refrigeration cycle comprising a compressor, a condenser and an evaporator, the evaporator comprising an evaporator according to claim 1 or 23.

15 36. A vehicle having installed therein a refrigeration cycle according to claim 35 as an air conditioner.